





Name: \_\_\_\_\_

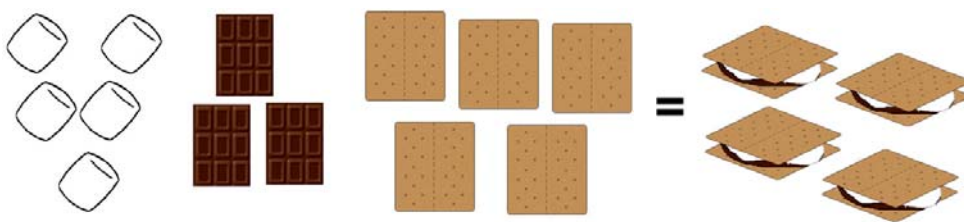
Date: \_\_\_\_\_

## Gizmo: Balancing Chemical Equations

### Part A: Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

The scouts are making s'mores  out of  
toasted marshmallows , chocolate , and graham crackers .

1. What do you think is wrong with the image below?



\_\_\_\_\_

\_\_\_\_\_

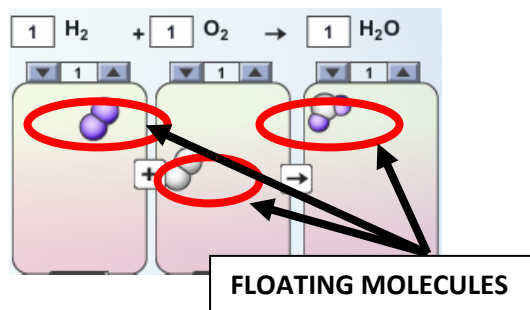
2. Assuming a s'more requires two graham crackers, one marshmallow, and one piece of chocolate, how many s'mores could you make with the ingredients shown? Explain your thinking.

\_\_\_\_\_

\_\_\_\_\_

### Part B: Gizmo Warm-up

In a chemical reaction, **reactants** interact to form **products**. This process is summarized by a chemical equation. In the *Balancing Chemical Equations* Gizmo™, look at the floating molecules below the initial reaction:  $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ .



- How many atoms are in a hydrogen **molecule** ( $\text{H}_2$ )? \_\_\_\_
- How many atoms are in an oxygen molecule ( $\text{O}_2$ )? \_\_\_\_
- How many hydrogen and oxygen atoms are in a water molecule ( $\text{H}_2\text{O}$ )? \_\_\_\_\_
- In general, what does a **subscript** (such as the "2" in  $\text{H}_2$ ) tell you about the molecule?

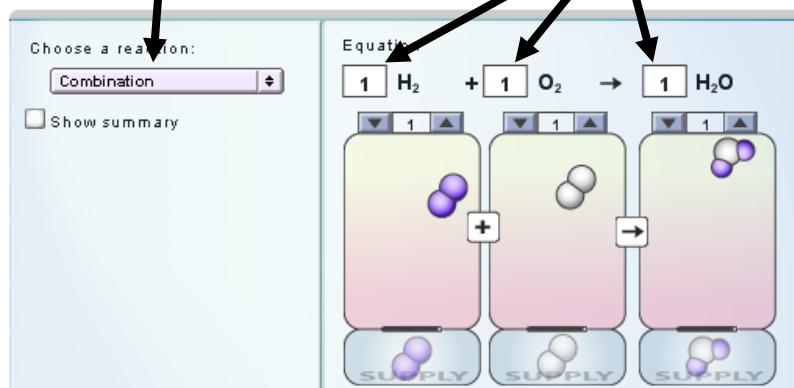
\_\_\_\_\_

5. A chemical equation is *balanced* if the number of each type of atom on the left side is equal to the number of each type on the right side. Is this reaction balanced? \_\_\_\_\_

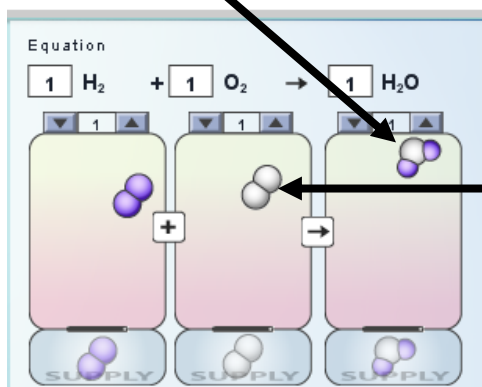
## Part C: Using the Gizmo

### Getting the Gizmo ready:

Check that the **Combination** reaction is selected and that all **coefficients** are set to one. (The coefficients are the numbers in the boxes.)



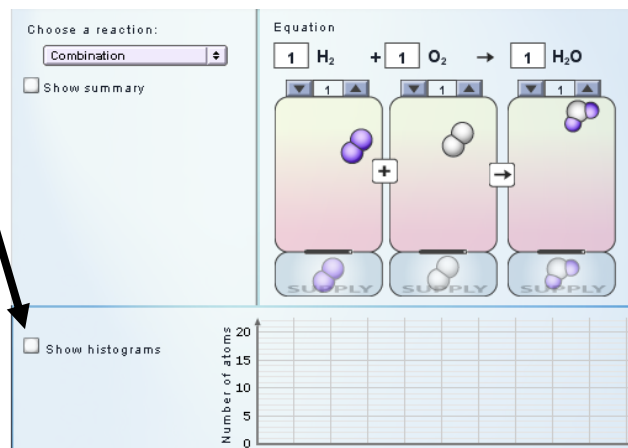
**Introduction:** The equation  $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$  is unbalanced because there are two oxygen atoms on the reactants side of the equation, and only one on the products side of the equation.



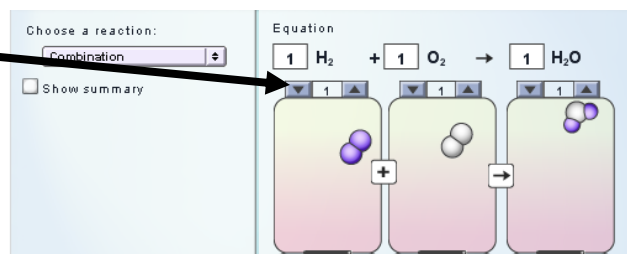
To balance the equation, you cannot change the structure of any of the molecules, but you can change the number of molecules that are used.

### Question: How are chemical equations balanced?

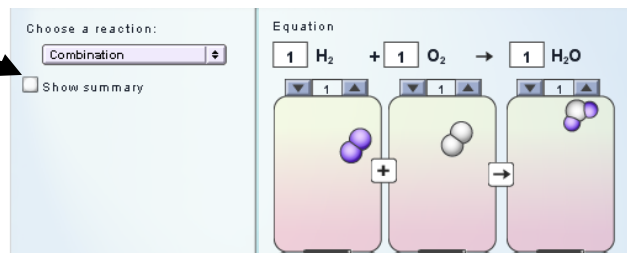
1. To Balance using the Gizmo: Turn on **Show histograms** by checking the box. The equation is balanced when there are equal numbers of each type of atom represented on each side of the equation. You will be able to observe this in the histogram.



In the Gizmo, use the up and down arrows to adjust the numbers of hydrogen, oxygen, and water molecules until the equation is balanced.



When you are done, turn on **Show summary** to check your answer.

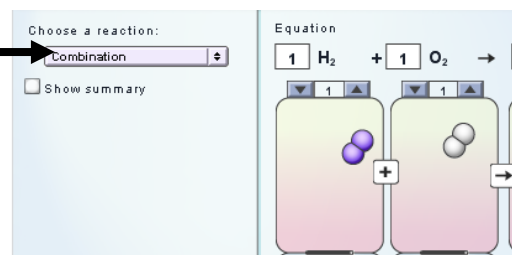


Write the balanced equation here: \_\_\_\_\_  $\text{H}_2$  + \_\_\_\_\_  $\text{O}_2 \rightarrow$  \_\_\_\_\_  $\text{H}_2\text{O}$

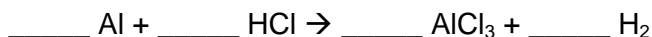


AND CHECK YOUR ANSWERS WITH THE TEACHER BEFORE YOU CONTINUE!

2. Solve: Turn off **Show summary**. Use the **Choose reaction** drop down menu to see other equations, and balance them. Check your answers by selecting **Show summary** and then write the balanced equations below:



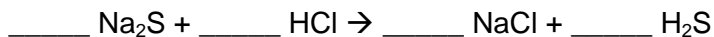
### Single Replacement



### Decomposition



### Double Replacement



AND CHECK YOUR ANSWERS WITH THE TEACHER BEFORE YOU CONTINUE!

## Part D: Summary

1. For the following reaction, label the **reactants**, **products**, one **coefficient**, and one **subscript**.



2. Is the chemical equation in question #1 balanced? \_\_\_\_\_  
Check your answer by filling in the table below.



# of Atoms in Reactants	Atom	# of Atoms in Products
	C	
	H	
	O	

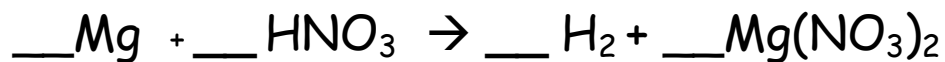
3. Would you change the **coefficients** or the **subscripts** in order to balance a chemical equation? Why do you think this is the case?

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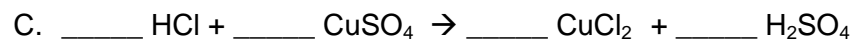
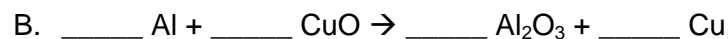
4. Try balancing the following chemical equation. Use the table below it to help you.



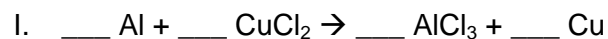
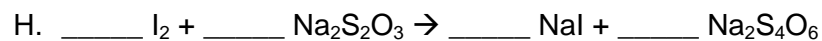
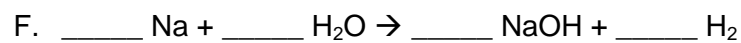
# of Atoms in Reactants	Atom	# of Atoms in Products
	Mg	
	H	
	N	
	O	

## Part E: Balancing Equations Practice Menu

**Main Course:** Balance all of the following chemical equations.



**Side Dishes:** Balance at least three of the following chemical equations.



**Desserts:** These are optional. Write a complete, balanced chemical equation for one or more of the following word equations.

J. aluminum + sulfur  $\rightarrow$  aluminum sulfide

K. nitric acid + calcium carbonate  $\rightarrow$  water + carbon dioxide + calcium nitrate

L. iron (III) chloride + sodium hydroxide  $\rightarrow$  iron (III) hydroxide + sodium chloride

M. sulfuric acid + calcium hydroxide  $\rightarrow$

N. carbon dioxide + water  $\rightarrow$